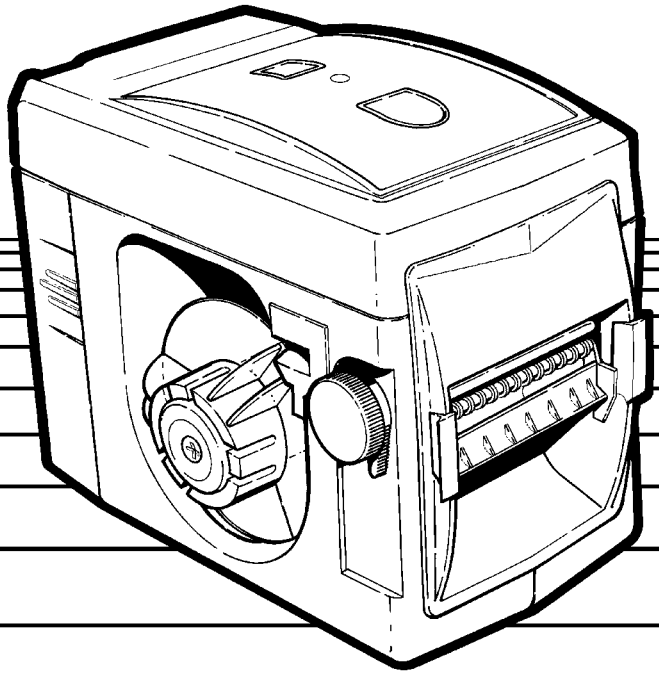
Monarch®
PAXAR

Monarch® 9450™ *RASCAL*® Printer



Programmer's Manual

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Monarch Marking Systems, Inc.
P.O. Box 608
Dayton, Ohio 45401

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Preface

This manual describes how to use RASCAL® printer Control Language (RCL) commands with the RASCAL printer. With these commands, you can

- create and print labels.
- configure and operate the printer.

You should have some programming background and a thorough knowledge of the host you will use with the printer. Following is a summary of the manual.

Chapter 1	**Getting Started** Describes how to create and print labels.
Chapter 2	**Fields and Formats** Explains how you use fields and formats.
Chapter 3	**Command Reference** Describes each RCL command and gives examples.
Chapter 4	**Response Reference** Explains how the printer responds to certain commands.
Appendix A	**RCL Samples** Lists sample formats and data streams.
Appendix B	**Printer Pin Outs** Lists the pin outs for the RASCAL printer.
Appendix C	**Bar Code Densities** Describes the densities of the bar codes available with the printer.

Terms to Know

Review the following list of terms before you read this manual.

Batch	Data stream containing information specifying the format, the number of copies, and the data for printing.
Continuous mode	Operation mode in which the printer dispenses labels in a continuous strip.
Data stream	Sequence of one or more RCL commands.
Decrementing fields	Fields where data decreases by one for each label in a batch.
Dot	Smallest unit of print on a label. A dot is 1/203rd of an inch on the printer. You measure it across the width of the printhead.
Field	Area containing data on a format.
Format	Layout of the printed label, containing one or more fields.
Incrementing fields	Fields where data increases by one for each label in a batch.
Indexed supplies	Supplies with pre-printed black marks or apertures on them. The printer detects these marks or apertures to determine proper supply registration. Non-indexed supplies do not have these marks or apertures.
Length axis	Length of a format measured in the feed direction. Use this axis to position a field up or down on a supply. The maximum length is 1015 dots (5 inches).
On-demand mode	Operation mode in which the printer dispenses labels one at a time. The operator must press **[Feed]** to print each one.
Sleep mode	The printer enters a low power state when it has been inactive for a specified period of time. It "awakens" when it receives a transmission or the operator presses **[ON/OFF].** See the *Operator's Handbook* for more information.

Supplies	Tags, labels, or thermal paper the printer prints on.
Top-of-form	Position where the supply stops for the start of printing. You may adjust the top of the form to compensate for supply variations and peel mode.
Width axis	Width of a format or supply. Use this axis to position a field left or right on a format. The maximum width is 383 dots (1.89 inches).

Conventions of this Manual

Bold text in the Courier font indicates an example or syntax description. For example, **^C¦^**.

Related Documentation

Operator's Handbook	Explains how to operate and maintain the printer.
9459™ Interface Manual	Explains how to connect the supported hosts to the printer.

Related Software

9450™ Label Design Software Manual	Label Design software that works in a DOS environment.
2050™ Download Utility	Download software that works in a DOS environment. It downloads fonts and text files, clears printer errors, requests the printer status, determines how much printer memory is used and free, deletes items from the printer library items, deletes all batches, deletes the current batch, and requests the printer's inventory.
Monarch® Platform™ Font Utility (2335)	Font utility that works in a Windows® environment and converts Hewlett-Packard® and TrueType™ fonts into fonts that can be interpreted by several Monarch® printers (including the 9450™ printer).
Monarch® Platform™ Format Editor (2330)	Label Design software that works in a Windows® environment.
Monarch® Platform™ Entry Services (2320)	Data Entry software that works in a Windows® environment and uses formats created Format Editor.
Monarch® Platform™ Spooler (2310)	This software works in a Windows® environment and manages print jobs.

Chapter 1. Getting Started

You use the RASCAL printer Control Language (RCL) to print labels and operate the printer. There are several RCL commands. However, you need only three commands to design and print a label.

NOTE: The printer prints on labels, tags, and thermal paper. For simplicity, this manual refers to all of these supplies as *labels*.

The label design is called a *format*. A format consists of one or more *fields*, which contain data.

To create a label:

1. **Design a format** to resemble how you want the label to look.
2. **Define the fields using the ^R command**.
3. **Incorporate the format using the ^T command.**
4. **Specify print data and the quantity using the ^P command**.
5. **Create the data stream**.
6. **Download the data stream**.
7. **Modify a format** as necessary.

This chapter guides you through this procedure, using a sample label for an item in an appliance store. The description of each step refers to the sample label. At the end of each step is an example of information you need to create the sample appliance label.

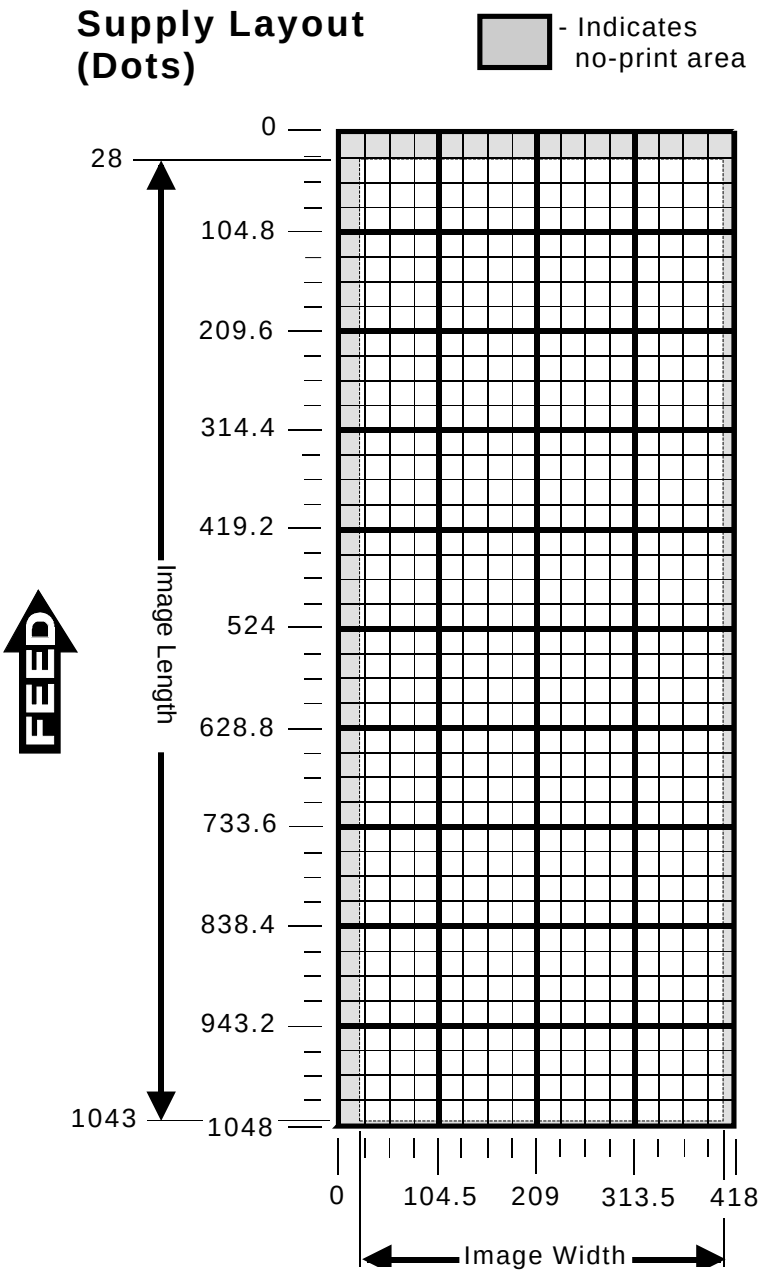
See Chapter 3, "Command Reference," for more information on RCL commands.

Designing a Format

To design a format, you must decide which fields to print, where the fields appear, and how the fields appear (size, normal or inverse printing, etc.).

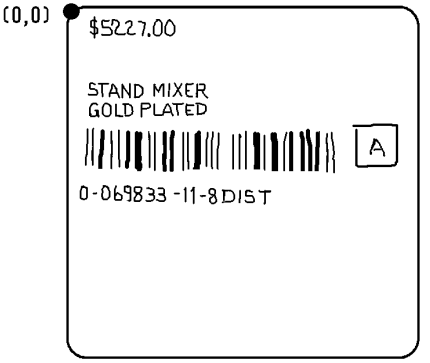
The easiest way to design a format is to sketch your ideas. You might also find it helpful to use the following grid, which is measured in dots and appears in actual size. You may want to make copies of this grid for use with formats you design in the future.

NOTE: A dot is 1/203rd of an inch.


Supply Layout
(Dots)
- Indicates
no-print area
0
28
104.8
209.6
314.4
419.2
524
628.8
733.6
838.4
943.2
1043
1048
Image Length
FEED
0
104.5
209
313.5
418
Image Width

Example

The sample appliance label must contain (from top-to-bottom) the price, a two-line description, a UPCA bar code to identify the item, and two secondary data fields. In the following steps, you will create the sample appliance label, shown below as a hand-drawn sketch.



Defining Fields using the ^R Command

In this step, you begin translating your design into a data stream. Define the fields using the **^R** command to specify

- location
- type
- rotation
- size
- type of printing
- the data (optional).

A summary of the command appears after the example.

See "Define Field (**^R**)" in Chapter 3 for the syntax and descriptions or see Chapter 2, "Fields and Formats" for more general information.

Example

In the following data stream, ^R¦$¦DR¦^ deletes all current fields and formats, and all the other commands define the fields on the appliance label.

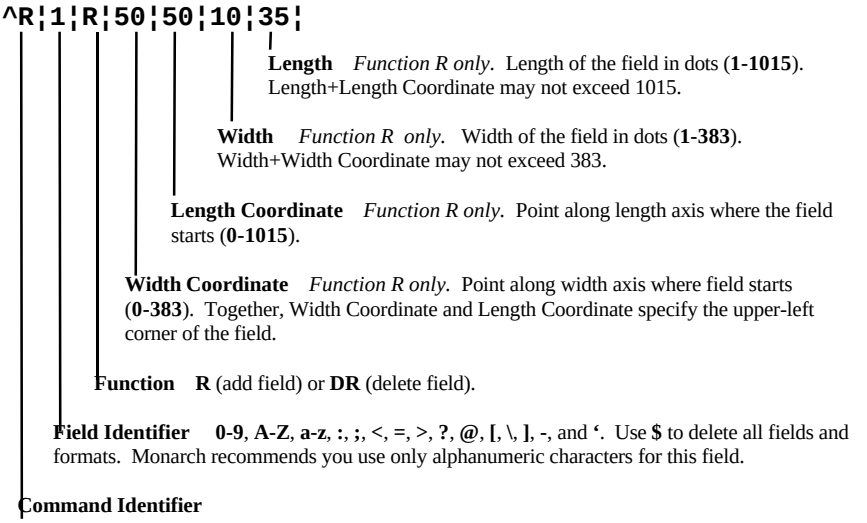
```
^R¦$¦DR¦^ DELETE CURRENT FIELDS
^R¦1¦R¦20¦10¦354¦25¦0¦0¦0¦8¦1¦1¦0¦0¦¦^ PRICE FIELD
^R¦2¦R¦20¦85¦340¦25¦0¦0¦0¦8¦1¦1¦0¦0¦¦^ DESC FIELD 1
^R¦3¦R¦20¦105¦340¦25¦0¦0¦0¦8¦1¦1¦0¦0¦¦^ DESC FIELD 2
^R¦4¦R¦20¦130¦340¦60¦0¦0¦0¦a¦3¦0¦48¦0¦¦^ UPCA
^R¦5¦R¦345¦142¦30¦25¦0¦0¦0¦8¦1¦1¦0¦0¦¦^ "A" IN BOX
^R¦6¦R¦10¦200¦300¦25¦0¦0¦0¦8¦1¦1¦0¦0¦¦^ UNDER UPCA
^R¦7¦R¦330¦130¦50¦50¦0¦0¦0¦A¦3¦0¦0¦0¦¦^ BOX
```

Command Summary

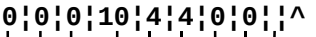
The **^R** command deletes or defines a field. To define a field, supply

- the field identifier
- the position of the field
- the length and width of the field
- the field type
- the attributes, such as rotation, justification, and multipliers.

NOTE: Due to space limitations in this manual, this command summary appears on two pages. In a data stream, this command must appear on one line.


^R¦1¦R¦50¦50¦10¦35¦
Length Function R only. Length of the field in dots (1-1015). Length+Length Coordinate may not exceed 1015.
Width Function R only. Width of the field in dots (1-383). Width+Width Coordinate may not exceed 383.
Length Coordinate Function R only. Point along length axis where the field starts (0-1015).
Width Coordinate Function R only. Point along width axis where field starts (0-383). Together, Width Coordinate and Length Coordinate specify the upper-left corner of the field.
Function R (add field) or DR (delete field).
Field Identifier 0-9, A-Z, a-z, :, ;, <, =, >, ?, @, [, \,], -, and ‘. Use $ to delete all fields and formats. Monarch recommends you use only alphanumeric characters for this field.
Command Identifier

continued on next page



Fixed Data *Function R only*. Up to 40 bytes of fixed data for the field, or the starting number for an incrementing/decrementing field.

Data Attributes *Function R only*. **0** (line, graphic, variable text, or bar code that doesn't increment/decrement), **1** (fixed data), **2** (incrementing field), or **3** (decrementing field).

Printing Attributes *Function R only*. **0** (line, graphic, or if text, black characters on white), **1** (white characters on black-- text only), or **16-406** (height of bar code in dots)

Multiplier 2 *Function R only*. **0** (graphic, line, or wide element width of UPC, EAN or Code 128 bar code), **1-4** (text height multiplier), or **2-16** (wide element (thick line) width of all other bar codes).

Multiplier 1 *Function R only*. **0** (graphic), **1-4** (text width), **1-8** (narrow element (thin line) width of bar code), or **1-10** (thickness of a line in dots).

Field Type *Function R only*. **A** (lines), **a** (UPCA), **b** (UPCA +2), **c** (UPCA +5), **d** (UPCE), **e** (UPCE + 2), **f** (UPCE + 5), **g** (EAN 13), **h** (EAN 8), **j** (EAN 13+5), **k** (Code 39), **l** (I 2 of 5), **m** (Codabar), **n** (Code 128 set a), **o** (Code 128 set b), **p** (Code 128 set c), **q** (MSI), or **E-Z** (graphics). If a text field, use **1-12** or **16** to specify a standard font, or use a custom font identifier.

Justification *Function R only*. **0** (left-justified or non-text field), **1** (centered), or **2** (right-justified).

Rotation *Function R only*. **0** (0 degrees) or 1 (90 degrees). Use this field only with text or bar code fields.

Text Field Type *Function R only*. **0** (fixed-length field) or **1** (stretch field). Use this field with only text fields.

Incorporating the Format using the ^T Command

You incorporate the format by specifying the fields on the format. Be sure to download the fields used in the format before defining the format.

To define a format, use the **^T** command. Following the example is a summary of this command. See "Define Format (**^T**)" in Chapter 3 for the syntax and descriptions.

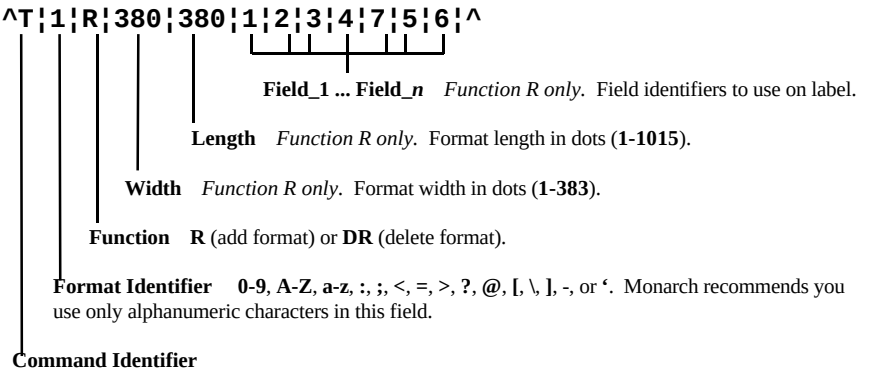
Example

The following command incorporates the fields into the format for the appliance label. The format has identifier 1, dimensions of 380 by 380 dots, and contains fields 1-7.

```
^T¦1¦R¦380¦380¦1¦2¦3¦4¦7¦5¦6¦^ FORMAT DEFINITION
```

Command Summary

The **^T** command combines pre-defined fields into a format. Specify a format identifier, the width and length of the format, and a list of fields in the order they appear on the label.


^T¦1¦R¦380¦380¦1¦2¦3¦4¦7¦5¦6¦^
Field_1 ... Field_n Function R only. Field identifiers to use on label.
Length Function R only. Format length in dots (1-1015).
Width Function R only. Format width in dots (1-383).
Function R (add format) or DR (delete format).
Format Identifier 0-9, A-Z, a-z, :, ;, <, =, >, ?, @, [, \,], -, or ‘. Monarch recommends you use only alphanumeric characters in this field.
Command Identifier

Specify Print Data and Quantity using the ^P Command

Use the **^P** command to indicate the data and quantity to print. Following the example is a summary of the **^P** command. See "Print (**^P**)" in Chapter 3 for the syntax and descriptions.

Example

The following command prints one copy of the appliance label using

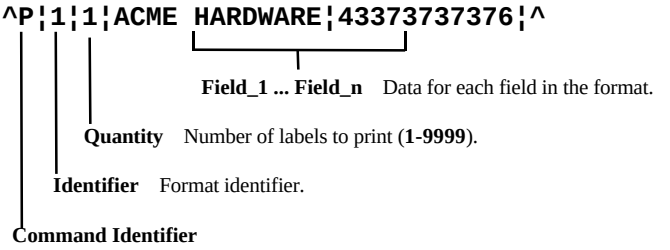
- **$5227.00** as the price.
- **STAND MIXER** and **GOLD PLATED** as the description.
- **12345678901** in the UPCA bar code.
- **A** and **0 -069833 -11 -8 DIST** as the secondary data.

```
^P¦1¦1¦$5227.00¦STAND MIXER¦GOLD PLATED¦
12345678901¦¦A¦0 -069833 -11 -8 DIST¦^ PRINT FORMAT
```

Command Summary

The **^P** command prints labels. Specify the format to use, the number of copies, and the data to use.

NOTE: **^P** and **{W** are the only two commands that you can spread over multiple lines. All others must fit on one line.


^P¦1¦1¦ACME HARDWARE¦43373737376¦^
Field_1 ... Field_n Data for each field in the format.
Quantity Number of labels to print (1-9999).
Identifier Format identifier.
Command Identifier

NOTE: For readability, you can put a carriage return, a line feed, or a carriage return and line feed after each ¦ character in the list of data for the fields. For example,

```
^P¦A¦10¦
Field 1¦
Field 2¦
Field 3¦^
```

Creating the Data Stream

Enter the data stream in a file using your host, then download the whole data stream at once.

NOTE: The first line (delete all current fields and formats) is not necessary unless you are going to download other fields or formats with the same identifiers.

Example

Following is the entire appliance label data stream.

```
1  ^R¦$¦DR¦^ DELETE CURRENT FIELDS
2  ^R¦1¦R¦20¦10¦354¦25¦0¦0¦0¦8¦1¦1¦0¦0¦¦^ PRICE FIELD
3  ^R¦2¦R¦20¦85¦340¦25¦0¦0¦0¦8¦1¦1¦0¦0¦¦^ DESC FIELD 1
4  ^R¦3¦R¦20¦105¦340¦25¦0¦0¦0¦8¦1¦1¦0¦0¦¦^ DESC FIELD 2
5  ^R¦4¦R¦20¦130¦340¦60¦0¦0¦0¦a¦3¦0¦48¦0¦¦^ UPCA
6  ^R¦5¦R¦345¦142¦30¦25¦0¦0¦0¦8¦1¦1¦0¦0¦¦^ "A" IN BOX
7  ^R¦6¦R¦10¦200¦300¦25¦0¦0¦0¦8¦1¦1¦0¦0¦¦^ UNDER UPCA
8  ^R¦7¦R¦330¦130¦50¦50¦0¦0¦0¦A¦3¦0¦0¦0¦¦^ BOX
9  ^T¦1¦R¦380¦380¦1¦2¦3¦4¦7¦5¦6¦^ FORMAT DEFINITION
10 ^P¦1¦1¦$5227.00¦STAND MIXER¦GOLD PLATED¦
   12345678901¦¦A¦0 -069833 -11 -8 DIST¦^ PRINT FORMAT
```

NOTE: The large numbers to the left of the example identify the commands and are not part of the data stream.

This data stream

- deletes all current field and format definitions from the printer (command 1).
- defines fields 1-7 (commands 2-8).
- defines format 1, specifying it consists of fields 1-7 (command 9).
- prints the format pictured below (command 10).

Downloading the Data Stream

RCL data streams must be sent to a printer by either using communications software, or by using the DOS COPY command. For a list of supported hosts and information about connecting them to the printer, see the *9459 Interface Manual*.

To download a data stream from a PC:

1. Determine the printer's current communication parameters by printing a test label. See the *Operator's Handbook*.

2. Connect your printer to the serial port of the PC using Monarch cable 11658714 (9 pin) or 11658715 (25 pin). The 9-pin cable comes with the Programmer's Kit. You must order the 25-pin cable separately. See the *Operator's Handbook* for more information.

3. Set the PC's communication parameters to match the printer's communication parameters. You can use the DOS MODE command or a communications package that transfers ASCII files.

   Example: `MODE COM1:9600,N,8,1,P`

   This command sets communication parameters for COM1 to 9600 baud, no parity, 8 word length, and 1 stop bit. It also retries communications until the printer accepts the transmission.

   NOTE: If you use the MODE command, use DTR flow control in the printer. If you're using a communications package, see its documentation.

4. Set the flow control to match on the printer and PC. To set it on the printer, see the *Operator's Handbook*. To set it on the PC, use a utility program.

5. Send the data stream file to the serial printer port. If you're using a communications package, see its documentation. If you used the MODE command in step 3, use the COPY command now:

   Example: `COPY PRINT.DST COM1`

   This command sends the file PRINT.DST (containing a data stream) to port COM1. The data stream can have any file extension.

Modifying a Format

You may modify the format as often as you need. Go back to the appropriate point in this procedure and repeat the steps.

Chapter 2. Fields and Formats

This chapter includes detailed information about

- using field types.
- positioning a field on a format.
- specifying the field data.
- using the printer library.

Using Field Types

Fields may contain

- text
- bar codes
- lines
- graphics.

Text Fields

Text fields include letters, numbers, and special printing and non-printing characters. A field can contain up to 200 characters. When creating a text field, specify which font to use. You can use one of several printer-resident fonts or one of your own.

If a character is not in the font the printer is using, the printer prints a space in place of the character. See “Font Download,” in Chapter 3 for information about downloading other fonts. Also, see “Library Management,” in Chapter 3 for information about deleting fonts.

Incrementing and *decrementing* fields are special types of fields. They change by one for each label in a batch. For example, for an incrementing field, if the first label has 001 on it, the second would have 002, etc. Decrementing fields are the same, but the number would decrease for each label. You specify the starting number in the fixed_data field of the **^R** command. Include leading zeros for the starting number to make it the same length as the maximum number. For example, if the first number is 1 and the maximum number is 999, enter 001 for the starting number. The printer calculates the number for each label. These fields must always be numeric and no more than 11 digits long. Also, only one text field and only one bar code field per format can be incrementing or decrementing.

Standard Fonts

The printer uses CG Triumvirate Bold™ and CG Triumvirate Bold Condensed™ as standard fonts, described in the following table. Identifiers 1-6 are for CG Triumvirate Bold. Identifiers 7-12 are for CG Triumvirate Bold Condensed.

ID	Point Size	Character Set	Cell Height*	Default Width	Default Height	Memory
1	6.5	Alphanumeric	20	8	11	3248
2	8	Alphanumeric	25	10	14	3820
3	10	Alphanumeric	30	12	17	4864
4	12	Alphanumeric	35	15	22	6704
5	18	Numeric	51	47	52	3632
6	22	Numeric	63	56	63	4896
7	6.5	Alphanumeric	20	6	11	2688
8	8	Alphanumeric	24	8	15	3808
9	10	Alphanumeric	30	10	18	4656
10	12	Alphanumeric	35	11	22	6260
11	18	Numeric	49	42	50	3376
12	22	Numeric	59	50	60	4768

* The height of your field must be at least this amount, or the field will not print.

NOTE: Cell Height, Default Width, and Default Height are in dots.

You can view the printer's resident font ID's by printing a test label. See the *Operator's Handbook* for more information. Font 16 is used for Monarch internal use only and cannot be deleted.

Custom Fonts

You can customize the fonts in your printer. Identifiers 13-15 are available for you to use with your own fonts. If you delete the standard fonts, you can re-use identifiers 1-12, too. Contact technical support at the number on the back of this manual to add your own fonts. Monarch recommends that you do not use custom fonts on a 128K printer without first deleting the standard fonts. If you have more memory, you can have both standard and custom fonts.

Bar Code Fields

Bar codes encode data so a scanner can read it. You can use one of the following bar codes available in the printer.

NOTE: Bar codes produced using single dot elements may not be scannable.

- UPCA (+2, +5)
- UPCE (+2, +5)
- EAN 13+5
- EAN 13
- EAN 8
- Code 39
- I 2 of 5
- Codabar
- Code 128 (sets a, b, and c)
- MSI

You cannot add or delete bar codes other than the ones included with the printer.

Bar codes cannot be incrementing or decrementing, as described in "Text Fields," earlier in this chapter, unless there is an incrementing or decrementing field on the same format.

NOTE: Do not use an MSI bar code with an incrementing text field. This combination may cause the check digit on the MSI bar code to be incorrect.

Note the characteristics items about bar codes:

- Codabar uses "A" as the start and stop characters, unless you include another start/stop character in the print batch data.
- Bar codes can accept 200 characters for their input data.
- I 2 of 5 bar codes pad the field data to the left with a zero when you give it an odd number of data characters.
- The printer calculates check digits and adds them to the bar code data for all bar codes with system check digits.
- If you assign too few characters to bar codes that require a certain number of characters, an error occurs. If you assign too many characters, the printer truncates the data.

Code 128 Bar Code Fields

Code 128 bar codes use four characters to perform special functions. To use the function characters in a bar code, imbed the corresponding sequence (preceded by a tilde (~)) in the bar code's data (you specify the data with the ^P or ^R command). For example, suppose your data is 1234. You might enter 123~2034 to use function 4.

Function 1 **Char. Sets: A, B, C** **Enter: ~200**

If ~200 occurs in position 1 or 2 of the data, the scanner treats the data as fitting the UCC standard. If ~200 occurs in any other position, the scanner treats it is a field separator.

Function 2 **Char. Sets: A, B** **Enter: ~201**

If the scanner reads ~201 anywhere in the data, it stores the data temporarily and prefixes it to the data in the next Code 128 bar code it reads.

Function 3 **Char. Sets: A, B** **Enter: ~202**

If the scanner reads ~202 anywhere in the data, it treats the entire bar code as instructions to program the scanner.

Function 4 **Char. Sets: A, B** **Enter: ~203**

Character sets A and B consist of characters 0-127 of the ASCII chart. However, using function 4, you can access characters 128-256. For example, the character "a" is ASCII 97. By preceding "a" with ~203 in your data, you change the "a" to ASCII 225 (97+128). A single ~203 shifts only the next character. Two ~203's shift the data until the end of the bar code or until another two ~203's appear.

Line Fields

The lines you print can be vertical or horizontal. You can also create boxes. See "Creating a Box Field" in Chapter 3 for more information.

NOTE: Thick lines use more battery power during printing.

Graphic Fields

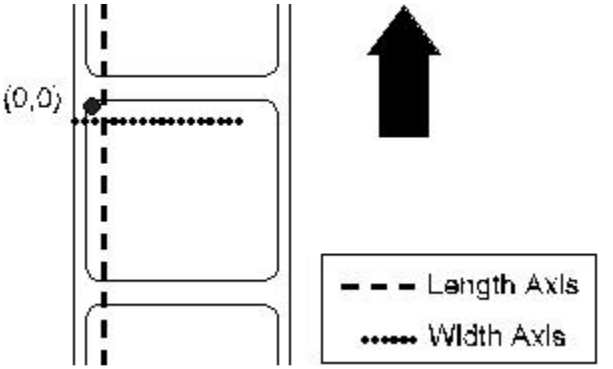
You can print graphics, such as a logo, on your labels. Using almost any PC drawing program, create graphics and save them as black and white .PCX files. Graphics remain in printer memory until you delete them.

See "Library Management (^l)" in Chapter 3 to learn how to download or delete graphics.

NOTE:
- Dark cells of graphics cannot exceed
- 20 percent of a tag or label.
- 50 percent of any square inch of the tag or label.

Positioning a Field on a Format

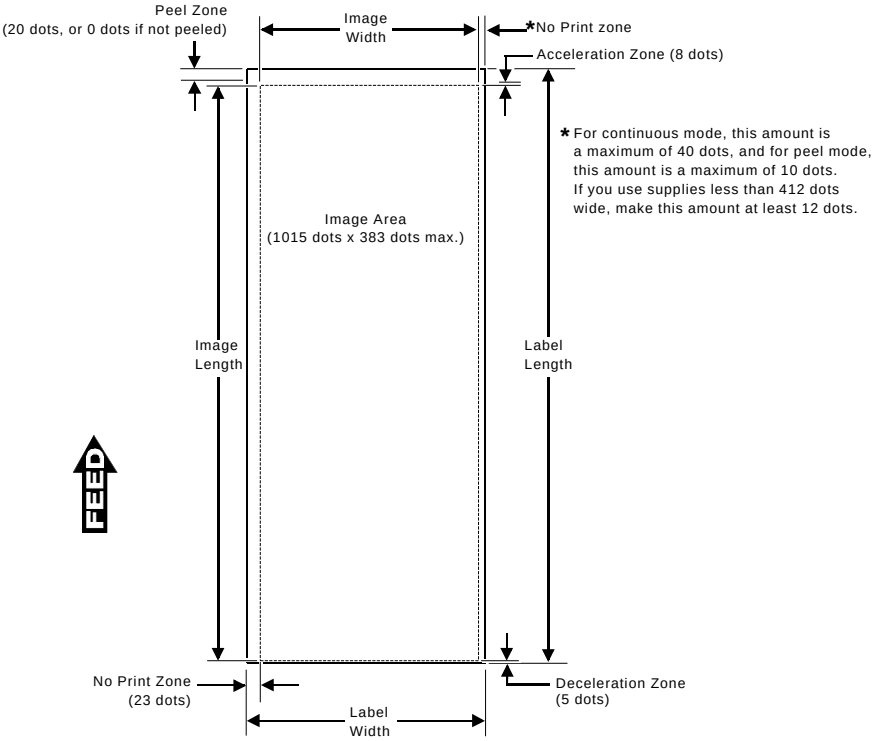
You use a coordinate system to place a field on a format. The following diagram shows this system.



The (0,0) coordinate is the upper left-hand corner of the format. For example, to position a field at (40,30) move 40 dots to the right of (0,0) and 30 dots down.

The maximum length of a format is 1015 dots (5 inches). The maximum width is 383 dots (1.89 inches). For continous mode, use supplies up to a maximun of 2.2 inches (446 dots). For peel mode, use supplies up to a maximum of 2.05 inches (416 dots). Contact Monarch if you have special label requirements.

There are limitations to where you can place fields. The following diagram shows these limitations.


Peel Zone
(20 dots, or 0 dots if not peeled)
Image
Width
*No Print zone
Acceleration Zone (8 dots)
* For continuous mode, this amount is a maximum of 40 dots, and for peel mode, this amount is a maximum of 10 dots. If you use supplies less than 412 dots wide, make this amount at least 12 dots.
Image Area
(1015 dots x 383 dots max.)
Image
Length
Label
Length
FEED
No Print Zone
(23 dots)
Deceleration Zone
(5 dots)
Label
Width

Specifying Field Data

For fixed data, specify the data when you define the field with the **^R** command. For variable data, specify the data when you print the format with the **^P** command.

For example, you would specify a field containing the store name with the **^R** command because the store name does not change from batch to batch. However, you would specify a field containing a price with the **^P** command because the price may change with each batch.

Using the Printer Library

The printer has a library where it stores

- formats
- fields
- fonts
- graphics.

By using this library, you can easily create your formats. For example, suppose you have a graphic you want to appear in several formats. Download the graphic once. Then, use the graphic in as many data streams as you want. Use the **^l** command to request an inventory of the library. To add or delete items from the library, use the following commands.

Command	Function
^T	Adds or deletes formats.
^R	Adds or deletes fields.
^l	Adds or deletes graphics.
{W	Adds fonts.
^l	Deletes fonts.

See Chapter 3, "Command Reference" for information about these commands.

Chapter 3. Command Reference

This chapter describes the RCL commands in detail, and they appear in alphabetical order. If two commands have the same letter (for example, ^S and ^s), the command with the uppercase letter appears first. Following is a summary of each command.

Command	Description
^A	**Change Communication Parameters** Changes the printer's baud rate, parity, word length, and flow control.
^C	**Clear Error Status** Clears batch errors from memory.
^F	**Delete Batches** Deletes all batches or only the current batch from the printer.
^L	**Set Supply Length** Specifies the type of supply in the printer and where data prints vertically on the label.
^I*	**Library Management** Adds or deletes graphics, deletes fonts, formats, and fields from the printer library, or takes inventory of the printer library.
^O	**Select Printer Operation Mode** Sets the printer to on-demand or continuous dispense mode.
^P	**Print** Specifies batch data and prints a specified number of labels.
^R	**Define Field** Defines or deletes a field from the printer library.
^S*	**Request Printer Status** Returns the printer's status to the data collection terminal.
^s	**Sleep Mode** Starts, adjusts, or disables sleep mode.

continued on the next page

* These commands sometimes request a response from the printer. To learn more about printer responses, see Chapter 4, "Response Reference."

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Command	Description
^T	**Define Format** Creates or deletes a format.
^tavg	**Adjust Print Contrast** Darkens or lightens the print by a specified percentage.
{W**	**Font Download** Sends a font to the printer from the host.

** This command does not use a ^ character.

The following pages provide descriptions and syntax for each command. See Appendix A, "RCL Samples" for data stream samples.

Syntax Conventions

Following is the structure of an RCL command. This general syntax does not apply to the **{W** command.

NOTE: Each command (except {W) begins and ends with a caret character (^). A split vertical bar (¦) separates each field in the commands.

`^Cmd_ltr¦field_1¦...¦field_n¦^space comment`

Field	Description
^	Starting token.
cmd_ltr	Command letter.
field_1 ... field_n	*Optional.* Fields supplying information to the command. Not all commands have these fields. When you need to use the following characters in these fields, substitute the corresponding sequence instead. **Character** — **Sequence** Split vertical bar (¦) — ~124 Caret (^) — ~094 Left Brace ({) — ~123 Tilde (~) — ~126 Sometimes the instructions say to leave the field blank. To do so, enter only a split vertical bar.
^	Ending token.
space	A space character (required if you specify a comment).
comment	*Optional.* Enter any comment between this point and the end of the line.

NOTE: All RCL commands (except {W and ^P) must fit on one line. Sometimes they appear on two lines in this manual due to space limitations.

Changing Communication Parameters (^A)

Use this command to change the printer's

- baud rate
- parity
- word length
- flow control.

The printer always uses one stop bit. The new values take effect immediately.

After downloading this command, change the communication parameters on the host to the new settings.

NOTE: This command assumes the communication parameters for the printer and the host *already* match. If they don't already match, set the printer's communication parameters manually. See the *Operator's Handbook* for information.

Syntax

```
^A¦baud_rate¦parity¦word_length¦flow_control¦^
```

Parameter	Value	Description
baud_rate	2	1200
	3	2400
	4	4800
	5	**9600**
	6	19200
	7	38400*
parity	**N**	**None (use only for word_length 8)**
	E	Even (use only for word_length 7)

*On some printer/terminal systems, 38400 may not be a reliable baud rate. If you have problems, lower the baud rate.

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Parameter	Value	Description
word_length	**8**	**8 bits (use only for N parity)**
	7	7 bits (use only for E parity)
flow_control	**X**	**XON/XOFF**
	C	DTR (the PC default)
	D	DTR (the PC default)

NOTE: Default values are listed in **bold**.

If you change the flow control from DTR to XON/XOFF, the printer sends an XON character after it reconfigures the serial port.

NOTE: If the flow control parameters for the host and printer do not match, the LED indicator will flash 1/4 second blinking amber and the printer will not respond to the host. Press **[Feed]** to clear the printer's memory and reset the printer, and set the correct flow control parameters. See the *Operator's Handbook* for more information.

Example

```
^A¦5¦N¦8¦X¦^
```

This command configures the printer for 9600 baud, no parity, an 8-bit word length, and XON/XOFF flow control.

Clear Error Status (^C)

The Clear Error Status command clears batch errors from memory. In general, batch errors involve software problems (e.g., invalid commands or bad data). Correct the error, send this command (or press **[Feed]**), and continue operation.

System errors involve hardware or operation problems (e.g., low battery, out of paper). The printer clears system errors automatically when you correct the condition.

See "Status Flags" and "Clearing Status Bits" in Chapter 4, "Response Reference" for more information.

Syntax

^C¦^

Delete Batches (^F)

The Delete Batches command removes the current batch after it prints the next complete label or removes all batches immediately. To remove the current batch manually, press **[Feed]** for 3-5 seconds.

Syntax

^F¦function¦^

function	**A**	Remove all batches
	C	Remove the current batch

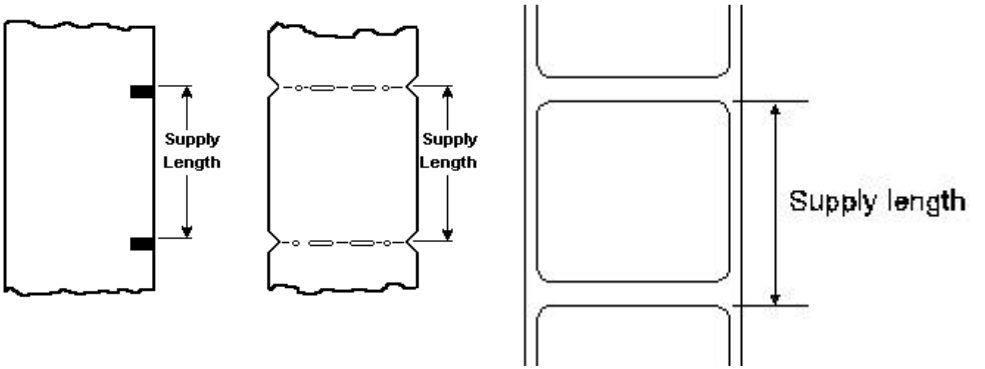
Example

^F¦A¦^

This command removes all batches from the printer.

Set Supply Length (^L)

The Set Supply Length command sets the type of supply you are using and defines where data prints vertically on the form. It also prints a blank label. The following diagrams illustrate how supply length is determined on various types of supplies.



Syntax

^L¦supply_type¦vertical_pos¦^

supply_type The type of supplies you're using.

F Indexed (black mark)
C Non-indexed (no black mark)

vertical_pos If **supply_type** is F, enter the value to position the data vertically on the label. This value is typically 109. However, you can alter it (a larger number positions data higher on the label; a smaller number positions data lower on the label). This value does not change until you change it with this command. Values range from 0 to 1015.

Example

```
^L¦F¦109¦^
```

This command informs the printer it is using indexed supplies and sets the vertical print position to 109. It also prints a blank label..

Library Management (^l)

The Library Management command

- adds black and white .PCX graphics to the printer library.
- deletes all graphics, fonts, formats, and fields from the printer library (except font 16). You must delete a font library before replacing it.
- takes inventory of the printer library. The printer responds with the Library Inventory response described in Chapter 4, "Response Reference."

NOTE: The letter for this command is a lowercase letter l, not the number one.

To download a graphic, use any communications program. For example, if you use the DOS MODE and COPY commands, you would:

1. Set your PC communication parameters and serial port with the MODE command.
2. Download the **^l** command to the serial port using the COPY command.
3. Download the .PCX file to the serial port. If you use COPY, be sure to include the /b switch.

NOTE: When downloading a graphic, be sure not to interrupt the previous procedure or send a graphic that exceeds the space alotted. Either of these conditions may lock the printer. To unlock the printer, send the ENQ character to the printer or remove and reattach the printer's battery.

Syntax

^l¦function¦memory¦identifer¦mem_req¦^

function	**A**	Add a graphic.
	D	Delete all graphics , fonts, fields, or formats.
	I	Take inventory.
memory	If **function** is A, enter R (printer RAM). Otherwise, leave this field blank (but remember to include the split vertical bar).	
identifier	The graphic identifier. Enter $ to delete all graphics or fonts. If **function** is I, leave this field blank (but remember to include the split vertical bar).	
mem_req	If **function** is A, enter the amount of memory for the graphic in bytes. Use the value listed for the file when you use the DOS DIR command. If the **function** is D, enter either A (to delete all fonts and graphics) or G (to delete all graphics, fields, and formats).	

Example

^l¦A¦R¦H¦5734¦^

This command specifies the header information for graphic H, which is 5734 bytes long. After receiving this command, send the graphic file to the printer.

Select Printer Operation Mode (^O)

The Select Printer Operation Mode command sets the printer to print and feed

- continuously (without pause) until the end of the batch.
- on-demand, or one at a time. The user must press **[Feed]** to print each label.

Continuous mode is the default print mode. After the printer mode has been changed, the printer stays at that mode until it is changed again.

Syntax

^O¦mode¦^

mode	**C**	Continuous mode
	D	On-demand mode

Example

^O¦D¦^

This command sets the printer to on-demand mode.

Print (^P)

The Print command prints a batch of labels using a specified format.

NOTE: If the printer battery loses power, replace the battery. The printer remembers the last batch. However, if you replace the battery without power loss, you'll lose the batch.

Syntax

^P¦identifier¦quantity¦field_1¦...¦field_n¦^

identifier	The format identifier.
quantity	The number of labels to print (1 to 9999). If you are using on-demand mode, the **quantity** must be two or greater.
field_1 ... field_n	The data for each field in the format. Provide data in the same order as the format definition. Text fields can contain up to 200 characters, including a carriage return, line feed, or carriage return/line feed combination. A carriage return, line feed, or carriage return/line feed combination creates a new line. For example, *Joe's<CR>Groceries* appears as: *Joe's* *Groceries*.

NOTE: For readability, you can put a carriage return, a line feed, or a carriage return and line feed after each ¦ character in the list of data for the fields. For example,

```
^P¦A¦10¦
Field 1¦
Field 2¦
Field 3¦^
```

Example

```
^P¦1¦1¦ACME HARDWARE¦43373737376¦^
```

This command prints one label using format 1, which contains two fields. Field 1 is *ACME HARDWARE*, and field 2 is *43373737376*.

Define Field (^R)

The Define Field command specifies information the printer must know about a field. In defining the location of this field, determine where the upper-left corner of the field is.

A field definition stays in the printer until you erase it with this command. You can store a maximum of 30 field definitions in the printer and use up to 30 fields per format. The printer discards definitions overflowing into available space.

NOTE: You can use a file in multiple formats.

Syntax

```
^R¦identifier¦function¦w-coord¦l-coord¦width¦length¦
txtfld_type¦rotation¦justification¦field_type¦mul_1¦mul_
2¦prt_attrib¦data_attrib¦fixed_data¦^
```

NOTE: The syntax for this command is spread over three lines due to space limitations in this manual. In an actual data stream, the command must fit on one line.

Identifier The field identifier. Enter any of the following characters: 0-9, A-Z, a-z, :, ;, <, =, >, ?, @, [, \,], -, and ‘. For more readable data streams, Monarch recommends that you use only alphanumeric characters. You cannot change this identifier after you create the field.

To delete all fields and formats, enter $.

If you want to add a field with the same identifier as an existing field, delete the existing field first.

Function
R Add
DR Delete

Use the following parameters only when **function** is R.

w-coord The point along the width axis where the field starts (0 to 383). The value you enter is a measurement (in dots) from the left side of the supply to the point (as the feed direction points away from you).

W-coord and **l-coord** specify the upper-left corner of the field.

l-coord The point along the length axis where the field starts (0 to 1015). The value you enter is a measurement (in dots) from the bottom of the supply to the point (as the feed direction points away from you).

width The width of the field in dots (1 to 383).

The sum of **w-coord** and **width** may not exceed 383, which is the width of the printhead.

length The length of the field in dots (1 to 1015).

The sum of **l-coord** and **length** may not exceed 1015. If the field is a bar code, enter at least 46 for a scannable bar code.

For the field to print, **length** must be at least the cell height of the font you use. See Chapter 2, “Fields and Formats,” for the cell heights. For a bar code, the minimum height is 16 dots.

NOTE: A dot is 1/203rd of an inch.

txtfld_type **Text fields only.** The size type of the data for the field.

0 Fixed-length field
1 Stretch field

A stretch field is a variable-length field. Note the following rules about stretch fields.

- Use only one stretch field per format.
- Place the stretch field at the bottom of the format and on a line by itself.
- Supply the data for a stretch field in the **^P** command.
- Do not rotate a stretch field.
- Print only one label at a time when using formats with stretch fields.

rotation **Text and bar code fields only.** The rotation of data within the field. Rotation occurs in a counterclockwise direction using the lower-left corner of the field as an anchor.

0 0-degree rotation
1 90-degree rotation

justification **Text fields only.** The placement for the data in the field. For non-text fields, enter 0.

0 Left Justification
1 Centered
2 Right Justification

NOTE: Monarch recommends that you use left justification for incrementing and decrementing fields.

field_type The field type identifier.

A	Lines
a	UPCA
b	UPCA +2 bar code
c	UPCA +5 bar code
d	UPCE bar code
e	UPCE +2 bar code
f	UPCE +5 bar code
g	EAN 13 bar code
h	EAN 8 bar code
j	EAN 13+5 bar code
k	Code 39 bar code
l	I 2 of 5 bar code
m	Codabar bar code
n	Code 128 set a bar code
o	Code 128 set b bar code
p	Code 128 set c bar code
q	MSI bar code
E-Z	Graphics

For resident text identifiers (fonts), see Chapter 2, "Fields and Formats." For information about Code 128 Bar Codes, see Appendix C.

mul_1 The first multiplier of the field. The meaning of this field depends on the field type.

Text	Width multiplier of the font.
	1 Multiply by 1
	2 Multiply by 2
	3 Multiply by 3
	4 Multiply by 4
Bar code	Narrow element (thin line) width of the bar code (1-8).
Line	Enter the line thickness in dots (1-10).
Graphic	Enter 0.

mul_2 The second multiplier of the field. The meaning of this field depends on the field type.

Text	Height multiplier of the font.	
	1	Multiply by 1
	2	Multiply by 2
	3	Multiply by 3
	4	Multiply by 4
Bar code	Wide element (thick line) width of the bar code.	
	0	UPC, EAN, and Code 128 bar codes
	2-16	All other bar codes
Graphic or Line	Enter 0.	

prt_attrib The printing attributes. The meaning of this field depends on the field type.

Text	**0**	Black characters on white
	1	White characters on black

NOTE: Printing white characters on black drains the printer battery quickly. Monarch recommends that you do not choose this option for incrementing or decrementing fields.

Bar code	Height of the bar code in dots (16-406). A dot is 1/203rd of an inch.
Graphic or Line	Enter 0.

data_attrib The field attributes.

0	The field is a line, graphic, or a variable text or bar code that neither increments nor decrements.
1*	The field data never changes (text).
2*#	Incrementing field (text or bar code).
3*	Decrementing field (text or bar code).

* These fields require you to enter something in the **fixed_data** field.

Do Not use an MSI bar code with an incrementing text field. This combination may cause the check digit on the MSI bar code to be incorrect.

fixed_data If the field never changes, enter up to 200 bytes of data in this field. Or, if it is an incrementing or decrementing field, enter the starting number in this field. Otherwise, leave it blank (but remember to include the split vertical bar).

NOTE: Except for the one incrementing or decrementing field per format, you cannot use this field for a bar code.

A carriage return, line feed, or carriage return/line feed combination in the field data creates a new line. For example, suppose the data is *Joe's<CR>Groceries*. On the label, it appears as:
Joe's
Groceries.

Example

```
^R¦1¦R¦50¦50¦10¦35¦0¦0¦0¦10¦4¦4¦0¦0¦¦^
```

This command defines a field that is 10 dots wide and 35 dots long at point (50,50). This field is fixed, left-justified, and not rotated. Also, this field uses font 10 and is 4 times as wide and high than normal.

Creating a Box Field

A box is a special field. To create one, use the ^R command, except you follow this procedure, too.

1. Enter **A** for field_type.
2. Choose the coordinates for the upper-left corner of the box. For example, if you choose (20,30), the corner would be 20 dots to the right and 30 dots down from the upper-left corner of the format. Enter those values for **w-coord** and **l-coord**. For example, enter *20* for **l-coord** and *30* for **w-coord**.
3. Choose the coordinates for the lower-right corner of the box. For example, if you choose (50,70), the corner would be 50 dots to the right and 70 dots down from the upper-left corner of the box.
4. Calculate the difference between the first coordinates of each corner and the difference between the second coordinates of each corner. Enter the results of your calculations in **width** and **length**, respectively. For example, enter *30* for **length** (50 - 20), and *40* (70 - 30) for **width**.

NOTE: Neither **width** nor **length** can be zero.

The following diagram explains the relationship between the fields you use.

Request Printer Status (^S)

The Request Printer Status command asks the printer for its current state. The printer responds with the Status response described in Chapter 4, "Response Reference."

Syntax

^S¦^

NOTE: If the printer has a low battery or the receive buffer is full, you can still receive the Status response by sending an ENQ character (hexadecimal 5) to the printer.

Sleep Mode (^s)

The Sleep Mode command starts sleep mode, adjusts the sleep mode time, or disables sleep mode (keeps the printer from entering sleep mode).

If sleep mode is disabled, the test label will show **F** immediately before the sleep mode time. See the *Operator's Handbook* for more information about sleep mode.

NOTE: To exit sleep mode, transition from low to high on either the RXD or CTS line. The printer cannot wake up if either line is held high continuously. The printer resumes normal mode within 100 milliseconds of the transition. You many lose data you send before the printer returns to normal mode.

Syntax

^s¦function¦time¦^

function	**G**	Start sleep mode
	A	Adjust sleep mode time
	D	Disable sleep mode

time The time (in seconds) the printer must be inactive before it enters sleep mode (default is 120 seconds). If **function** is A, enter a value from 10 to 5909. Otherwise, leave this field blank, but remember to include the split vertical bar.

Example

^s¦A¦20¦^

This command tells the printer to wait until it has been inactive for 20 seconds before entering sleep mode.

Define Format (^T)

The Define Format command creates or deletes a format. A format definition stays in the printer until you erase it with this command.

You can store up to 15 format definitions. The printer discards definitions overflowing into available space.

Syntax

^T¦identifier¦function¦width¦length¦field_1¦...¦field_n¦^

identifier The format identifier. Enter any of the following characters: 0-9, A-Z, a-z, :, ;, <, =, >, ?, @, [, \,], -, and ‘.

If you want to use the same identifier as a format already in the printer, delete the format in the printer.

function

R	Add format
DR	Delete format

Use the following parameters only when function is R.

width The format width in dots (1-383). A dot is 1/203rd of an inch.

length The format length in dots (1-1015).

field_1... field_n A list of up to 30 field identifiers used to print this label. These identifiers are from the **identifier** field of the **^R** command. List them as they appear from top to bottom on the format. You can list fields appearing side-by-side in any order. If the fields are not in order, an error occurs.

Example

^T¦1¦R¦380¦380¦1¦2¦3¦4¦7¦5¦6¦^

This command defines format 1 and stores it in RAM. The dimensions are 380 dots wide by 380 dots high, with fields 1 through 7.

Adjust Print Contrast (^tavg)

The Adjust Print Contrast command lightens or darkens the print by a specified percentage *from the printer's default setting*.

Syntax

^tavg¦direction¦percentage¦%¦^

direction	Adjustment direction. + Darkens the print - Lightens the print
percentage	Adjustment percentage. If you're darkening the print, enter a number from 1-35. If you're lightening the print, enter a number from 1-15. To return the print contrast to the default setting, enter 0.

Example

^tavg¦+¦35¦%¦^

This command darkens the print by 35 percent.

Font Download ({W)

The Font Download command sends information about new fonts to the printer. You can also use the Monarch Download Utility to download fonts.

NOTE: If you download a font that is greater than 32K, the printer will reject the download.

This command is only for new fonts. If you want to download a font using a number of an existing font, you must delete the existing font first. The standard fonts that the printer comes with are described in Chapter 2, "Fields and Formats."

Call sales at the number on the back of this manual to obtain new fonts for the printer, to see if any fonts you have work with the printer, or to order the Download Utility.

NOTE: Be sure to always back up your fonts.

Syntax

```
{W,identifier,A,R,mem-req¦
font_data¦
}
```

NOTE: This command starts with a **{** character and ends with a **}** character, instead of using the ^ character in both places, as the other commands do.

identifier The font identifier.

mem-req **One-sixteenth** of the memory (in bytes) needed to save the font image. For example, if the font requires 1600 bytes, enter 100. This value ranges from 0 to 2048.

font_data The data representing the font images (available from Monarch).

Chapter 4. Response Reference

The printer sends two different responses, depending on your request.

- Status Response (Printer Status Request)
- Library Inventory Response (Inventory Request)

These responses appear on your host. See the following sections for more information.

Syntax Conventions

Printer responses have the following structure.

\response_ltr¦field_1¦...¦field_n¦

Field	Description
\	Starting token for a response.
response_ltr	Response identifier letter.
field_1 ... field_n	Information fields.
\	Ending token for a response.

NOTE: The printer separates the information fields with a split vertical bar (¦).

Status Response (\S)

The printer responds to the Request Printer Status (**^S**) command with the Status response. See "Status Flags" in this chapter for more information.

NOTE: If the battery is low or the receive buffer is full, you can still receive the Status response by sending an ENQ character (hexadecimal 05) to the printer.

Syntax

\S¦0¦version¦status_flag_1¦status_flag_2¦status_flag_3¦last_batch¦

version	The software version.
status_flag_1, status_flag_2, status_flag_3	Three status flags, each represented by a byte. Because each bit in these bytes represents a different error, you must translate the bytes into a bit string to determine the status of the printer. For example, you might receive @ for status_flag_1, which translates to 01000000. By consulting "Status Flags" in this chapter, you see this means there are no errors.
last_batch	Two bytes in the format **P*x***, where *x* is the identifier of the format used in the last batch. The identifier is a space if you haven't run any batches since you powered on or reset the computer.

Example

\S¦0¦2.0¦@¦@¦@¦P1¦

This response indicates the printer is running version 2.0 software, and no errors occurred in the batch that used format 1.

Status Flags

There are three status flags. Each flag is a byte long, and each bit of the flag specifies a different error.

Status Flag 1

The following table describes the meaning of each bit in status flag 1.

Bit	Description
7	0 (constant).
6	1 (constant).
5	**Printer Activity Status** Describes whether the printer is idle (0) or printing labels (1).
4	**General Printer Status** Describes if the printer is working correctly (0) or an error occurred (1).
3	**Platen Status** Describes whether the printhead is lifted off the platen (1) or not (0).
2	**Supply Feed Status** Describes whether the the supplies are loaded (0) or not (1).
1	**Printhead Status** Describes whether the printhead is working correctly (0) or it has bad dots or a driver problem (1).
0	**Power Status** Describes whether the power is okay (0) or there is a low battery or other power supply problem (1). A low battery condition occurs when the battery voltage falls below 6.05 volts. When this problem occurs, you can use only the ENQ character to request the printer's status.

Status Flag 2

The following table describes the meaning of each bit in status flag 2.

Bit	Description
7	0 (constant)
6	1 (constant)
5	**Printhead Temperature Status** Describes whether the temperature of the printhead is okay (0) or too hot (1).
4	**Library Access Status** Describes whether the a field referenced in a format exists (0) or not (1).
3	**Field Data Status** Describes whether you defined a field correctly (0) or not (1).
2	**Library Load Status** Describes whether the last item you attempted to load into the printer library was loaded successfully (0) or not (1).
1	**Buffer Space Status** Describes whether the printer's communications buffers overflowed (1) or not (0).
0	**Job Memory Status** Describes whether a memory overflow occurred during the last batch job (1) or not (0).

Status Flag 3

The following table describes the meaning of each bit in status flag 3.

Bit	Description
7	0 (constant)
6	1 (constant)
5	**Command Status** Describes whether the last command downloaded to the printer was successful (0) or not (1).
4	**Printer Libraries Status** Describes whether the printer library is okay (0) or not (1).
3	0 (constant)
2	0 (constant)
1	0 (constant)
0	**Supply Status** Describes whether the printer can see a sense mark on the supplies (0) or not (1).

Status Flag Examples

This section gives examples of the status flags under various conditions. These examples do not cover all cases. Going left to right, these bit strings list bit 7 to bit 0. Each example lists

- the bit string for each flag.
- the ASCII character corresponding to the bit string.

Condition: Ready to print, no previous errors.

Flag 1	01000000	@
Flag 2	01000000	@
Flag 3	01000000	@

Condition: Ready to print, a previous batch error exists because the printer tried to reference an unknown library object.

Flag 1	01010000	P
Flag 2	01010000	P
Flag 3	01000000	@

Condition: Printhead is up.

Flag 1	01011000	X
Flag 2	01000000	@
Flag 3	01000000	@

Condition: Out of paper.

Flag 1	01010100	T
Flag 2	01000000	@
Flag 3	01000000	@

Condition: You loaded a new font and the printer is putting it into memory.

Flag 1	01100000	‘
Flag 2	01000000	@
Flag 3	01000000	@

Condition: The last batch contained invalid data.

Flag 1	01010000	P
Flag 2	01001000	H
Flag 3	01000000	@

Condition: The battery or power supply is low and the printer is currently printing.

Flag 1	01110001	q
Flag 2	01000000	@
Flag 3	01000000	@

Condition: The printer discarded the new format definition due to insufficient memory.

Flag 1	01010000	P
Flag 2	01000110	F
Flag 3	01000000	@

Condition: You sent a field definition to the printer, but it had an error.

Flag 1	01010000	P
Flag 2	01000100	D
Flag 3	01000000	@

Condition: You issued an add or delete command for a format or field, but specified an unsupported memory device type.

Flag 1	01010000	P
Flag 2	01000000	@
Flag 3	01100000	‘

Clearing Status Bits

When you correct printhead, paper out, temperature, or voltage errors, the printer clears the status bits automatically. You must clear the other status bits with the Clear Error Status (^**C**) command or by pressing **[Feed]**. For more information, see “Clear Error Status (^C)” in Chapter 3.

Library Inventory Response (\ll)

The printer responds to an inventory request from the Library Management (**^l**) command with the Library Inventory response.

Syntax

\lI¦report¦

report A screen- or printer-ready report describing the contents of the printer library. This report lists the amount of free and used memory (for fonts and graphics), and the formats, fields, fonts, and graphics stored in the printer.

Example

```
\lI¦mem used: 52763
mem free: 22328
templates: 1,D,e,@
print regions: 5,G,j,{
fonts: 1:1000,2:1001,7:1003,16:1004
graphics: E,F,H
¦\
```

This response indicates 52763 bytes of memory is used for fonts and graphics, 22328 bytes of memory is free for fonts and graphics, and the printer contains four formats (1, D, e, and @), four fields (5, G, j, and {), four fonts (1, 2, 7, and 16), and three graphics (E, F, and H).

Appendix A. RCL Samples

Use the sample data streams and formats in this section as models. There are samples for

- normal printing
- error recovery
- testing print contrast
- various formats.

NOTE: The large numbers to the left of each command in this chapter identify the line and are not part of the data stream.

Normal Printing

```
1  ^R¦$¦DR¦^
2  ^R¦1¦R¦10¦10¦370¦42¦0¦0¦0¦2¦1¦1¦0¦0¦¦^
3  ^R¦2¦R¦90¦50¦290¦60¦0¦0¦0¦a¦3¦0¦48¦0¦¦^
4  ^R¦3¦R¦10¦140¦290¦42¦0¦0¦0¦2¦1¦1¦0¦0¦¦^
5  ^R¦4¦R¦10¦200¦290¦42¦0¦0¦0¦2¦1¦1¦0¦0¦¦^
6  ^T¦1¦R¦300¦300¦1¦2¦3¦4¦^
7  ^P¦1¦1¦ACME HARDWARE¦43373737376¦Hammer¦$19.95¦^
```

This data stream

- deletes all existing fields and templates (command 1).
- defines fields (commands 2-5).
- creates a format with the fields (command 6).
- prints one copy of the format pictured below (command 7).

Error Recovery

```
1  ^S¦^
2  ^C¦^
3  ^F¦A¦^
```

This data stream

- requests the printer's status (command 1).
- clears the print error status bits from the status flags (command 2).
- removes all queued batches from the printer (command 3).

Testing Print Contrast

```
1  ^tavg¦+¦35¦%¦^
2  ^P¦1¦1¦ACE GROCERY¦Chicken Soup¦$1.95¦^
```

This data stream

- darkens the print by 5% (command 1).
- prints a label for you to see the new contrast setting (command 2).

It assumes you've already loaded the fields and format.

Format Sample 1

```
^R¦$¦DR¦^
^R¦1¦R¦20¦10¦300¦36¦0¦0¦0¦10¦1¦1¦0¦0¦¦^
^R¦2¦R¦20¦85¦200¦36¦0¦0¦0¦10¦1¦1¦0¦0¦¦^
^R¦3¦R¦20¦160¦200¦36¦0¦0¦0¦10¦1¦1¦0¦0¦¦^
^T¦1¦R¦383¦406¦1¦2¦3¦^
^P¦1¦1¦ITEM: JUMPSUIT¦SIZE: MEDIUM¦PRICE: $52.99¦^
```

This data stream prints the following label.

Format Sample 2

```
^R¦$¦DR¦^ DELETE ALL CURRENT FIELDS AND FORMATS
^R¦1¦R¦20¦10¦200¦35¦0¦0¦0¦10¦1¦1¦0¦0¦¦^ ITEM TEXT
^R¦2¦R¦160¦15¦200¦21¦0¦0¦0¦7¦1¦1¦0¦0¦¦^ ITEM FIELD
^R¦3¦R¦20¦85¦200¦35¦0¦0¦0¦10¦1¦1¦0¦0¦¦^ SIZE TEXT
^R¦4¦R¦160¦90¦200¦21¦0¦0¦0¦7¦1¦1¦0¦0¦¦^ SIZE FIELD
^R¦5¦R¦20¦150¦200¦35¦0¦0¦0¦10¦1¦1¦0¦0¦¦^ PRICE TEXT
^R¦6¦R¦160¦155¦200¦21¦0¦0¦0¦7¦1¦1¦0¦0¦¦^ PRICE FIELD
^T¦1¦R¦383¦406¦1¦2¦3¦4¦5¦6¦^ FORMAT DEFINITION
^P¦1¦1¦ITEM:¦BURGER¦SIZE:¦LARGE¦PRICE:¦$1.99¦^ PRINT
```

This data stream prints the following label.

Format Sample 3

```
^R¦$¦DR¦^
^R¦1¦R¦10¦10¦42¦370¦0¦1¦0¦2¦1¦1¦0¦0¦¦^
^R¦2¦R¦90¦90¦290¦60¦0¦0¦0¦a¦3¦0¦48¦0¦¦^
^T¦1¦R¦300¦300¦1¦2¦^
^P¦1¦1¦ACME HARDWARE¦43373737376¦^
```

This data stream prints the following label.

Format Sample 4

```
^R¦$¦DR¦^ DELETE CURRENT FIELDS
^R¦1¦R¦100¦10¦200¦31¦0¦0¦1¦1¦1¦1¦0¦0¦¦^
^R¦2¦R¦100¦200¦200¦31¦0¦0¦1¦1¦1¦1¦0¦0¦¦^
^R¦3¦R¦100¦250¦200¦31¦0¦0¦1¦1¦1¦1¦0¦0¦¦^
^T¦1¦R¦383¦406¦1¦2¦3¦^
^P¦1¦5¦ACE GROCERY¦Chicken Soup¦$1.95¦^
```

This data stream prints the following label.

Format Sample 5

```
^P¦1¦1¦Thrifty Cards & Gifts¦Greeting Card¦$1.25¦^
```

NOTE: This data stream, which uses the format defined in sample 4, prints the following label.

Appendix B. Printer Pin Outs

You use the printer with a host. The following table explains the printer's pin outs, so you can understand how the two devices are connected. See the host's documentation or the *9459 Interface Manual* for more information.

Pin	Description	Direction
1	CTS	Input
2	RTS	Output
3	TXD	Output
4	GND	
5	RXD	Input
6	DTR	Output
7	DSR	Input
8	+5 volts	Output

Appendix C. Bar Code Densities

This appendix lists density information for the standard printer bar codes. The pitch is 0.125.

Narrow Dots/Wide Dots

The following table compares the narrow element dots to the wide element dots.

NOTE: Bar codes produced using single dot elements may not be scannable.

Narrow Dots	Narrow Element Width (mm)	W:N Ratio	Wide Dots	Wide Element Width (mm)
1*	0.125	2.00	2	0.250
1*	0.125	3.00	3	0.375
2	0.250	2.00	4	0.500
2	0.250	2.50	5	0.625
2	0.250	3.00	6	0.750
3	0.375	2.00	6	0.750
3	0.375	2.33	7	0.875
3	0.375	2.67	8	1.000
3	0.375	3.00	9	1.125
4	0.500	2.00	8	1.000
4	0.500	2.25	9	1.125
4	0.500	2.50	10	1.250
4	0.500	2.75	11	1.375
4	0.500	3.00	12	1.500
5	0.625	2.00	10	1.250
5	0.625	2.20	11	1.375
5	0.625	2.40	12	1.500
5	0.625	2.60	13	1.625
5	0.625	2.80	14	1.750
5	0.625	3.00	15	1.875

continued on the next page

*May require special supplies to scan correctly.

continued from the previous page

Narrow Dots	Narrow Element Width (mm)	W:N Ratio	Wide Dots	Wide Element Width (mm)
6	0.750	2.00	12	1.500
6	0.750	2.17	13	1.625
6	0.750	2.33	14	1.750
6	0.750	2.50	15	1.875
6	0.750	2.67	16	2.000
7	0.875	2.00	14	1.750
7	0.875	2.14	15	1.875
7	0.875	2.29	16	2.000
8	1.000	2.00	16	2.000

Densities when Wide Dots are not Zero

The following table lists the densities of the Code 39, I 2 of 5, Numeric Codabar, and MSI bar codes for each narrow dot/wide dot combination.

NOTE: CPI stands for character per inch.

Narrow Dots	Wide Dots	Code 39 Density (CPI)	I 2 of 5 Density (CPI)	Numeric Codabar Density (CPI)	MSI Density (CPI)
1*	2	15.6	29.0	20.3	16.9
1*	3	12.7	22.6	16.9	16.9
2	4	7.8	14.5	10.2	8.5
2	5	7.0	12.7	9.2	8.5
2	6	6.4	11.3	8.5	8.5

continued on the next page

*May require special supplies to scan correctly.

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Narrow Dots	Wide Dots	Code 39 Density (CPI)	I 2 of 5 Density (CPI)	Numeric Codabar Density (CPI)	MSI Density (CPI)
3	6	5.2	9.7	6.8	5.6
3	7	4.8	8.8	6.4	5.6
3	8	4.5	8.1	6.0	5.6
3	9	4.2	7.5	5.6	5.6
4	8	3.9	7.3	5.1	4.2
4	9	3.7	6.8	4.8	4.2
4	10	3.5	6.4	4.6	4.2
4	11	3.3	6.0	4.4	4.2
4	12	3.2	5.6	4.2	4.2
5	10	3.1	5.8	4.1	3.4
5	11	3.0	5.5	3.9	3.4
5	12	2.9	5.2	3.8	3.4
5	13	2.7	5.0	3.6	3.4
5	14	2.6	4.7	3.5	3.4
5	15	2.5	4.5	3.4	3.4
6	12	2.6	4.8	3.4	2.8
6	13	2.5	4.6	3.3	2.8
6	14	2.4	4.4	3.2	2.8
6	15	2.3	4.2	3.1	2.8
6	16	2.3	4.1	3.0	2.8
7	14	2.2	4.1	2.9	2.4
7	15	2.2	4.0	2.8	2.4
7	16	2.1	3.8	2.7	2.4
8	16	2.0	3.6	2.5	2.1

Densities when Wide Dots are Zero

The following table lists the densities of the UPC, EAN, and Code 128 bar codes for each narrow dot amount. In each case, the number of wide dots is always zero.

Narrow Dots	UPC and EAN Ratio[A]	Code 128 Alpha[B] (CPI[C])	Code 128 Numeric[B] (CPI)
1[C]	38%	18.5	36.9
2	76%	9.2	18.5
3	114%	6.2	12.3
4	151%	4.6	9.2
5	189%	3.7	7.4
6	227%	3.1	6.2
7	265%	2.6	5.3
8	303%	2.3	4.6

[A]The UPC and EAN ratio is a percentage of the standard bar code size for the specified number of narrow dots.
[B]Alpha and Numeric specifications indicate the type of data, not a character set.
[C]Characters per inch.
[D]May require special supplies to scan correctly.

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